

We Claim:

1. An inherently three-dimensional, flexible container for articles to be cleaned in a non-immersion textile cleaning process, said cleaning process being comprised of placing articles to be cleaned into said container through an opening having a closure means, securing said closure means, and subjecting said articles within said container to a tumbling action in the presence of a cleaning agent.
2. The flexible container of Claim 1, wherein said container is in the form of a bag comprised of a textile substrate.
3. The bag of Claim 2 wherein said bag has sufficient inherent structural rigidity to maintain a free tumbling volume within said bag during said cleaning process.
4. A containment bag for articles to be cleaned in a non-immersion textile cleaning process, said cleaning process comprising placing articles to be cleaned into said bag through an opening having a closure means, securing said closure means, and subjecting said articles within said bag to a tumbling action in the presence of a cleaning agent, wherein said bag, when empty and with said closure means secured, readily defines an enclosed space having a predetermined three-dimensional shape, said bag having an inherent structural rigidity whereby said enclosed space is maintained sufficiently to promote, during said cleaning process, the free tumbling of articles placed in the bag.

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5. The bag of Claim 4 wherein said bag is reusable.

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The bag of Claim 4 wherein said bag is self-supporting.

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The bag of Claim 4 wherein said bag, when empty and with said closure means disengaged, is capable of being placed in a substantially flat configuration without overfolding.

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The bag of Claim 4 wherein said enclosed space is substantially in the form of a general prismaticoid, and is characterized by a free tumbling volume index of at least 0.4 and a semi-axis ratio of not more than 3.0.

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The bag of Claim 4 wherein said enclosed space is substantially in the form of a geometric solid selected from the group consisting of a rectangular solid, a cylinder, a rounded tetrahedron, and a tetrahedron, and wherein said enclosed space is characterized by a free tumbling volume index of at least 0.4 and a semi-axis ratio of not more than 3.0.

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The bag of Claim 4 wherein said bag is self-supporting.

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The bag of Claim 4 wherein said bag is in the shape of a general prismaticoid having at least one corner area, and wherein said corner area has been truncated along a line extending across said corner area, whereby said articles placed in said bag are prevented from occupying said corner area.

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The bag of claim 4, wherein said bag is in the shape of a tetrahedron, said tetrahedron having four corner areas, wherein said corner areas have been truncated along a line extending across said corner area, whereby said articles placed in said bag are prevented from occupying said corner.

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The bag of claim 10 wherein said corners have been truncated by a seam.

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The bag of Claim 4 wherein said inherent structural rigidity is provided, at least in part, by at least one rigidifying wall discontinuity.

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The bag of Claim 12 wherein said rigidifying wall discontinuity is a seam.

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The bag of Claim 13 wherein said rigidifying wall discontinuity is a closure device.

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The bag of Claim 14 wherein said closure device is a zipper.

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18. The bag of Claim 14 wherein said rigidifying wall discontinuity is a stiffening material applied to the surface of the bag in a pattern configuration.

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19. The bag of Claim 18 wherein said stiffening material is a rigidifying polymer facing applied to the exterior surface of said bag.

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20. The bag of Claim 18 wherein said bag is in the shape of a general prismatoid having at least one corner area, said stiffening material is a polymer, and said pattern configuration of said polymer selectively excludes said corner area, thereby predisposing said corner area to crushing during said cleaning process.

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21. The bag of claim 18 wherein said bag is in the shape of a tetrahedron having four corner areas, said stiffening material is a polymer that is applied to the exterior surface of said bag, and said pattern configuration of said polymer selectively excludes said corner areas, thereby predisposing said corner areas to crushing during said cleaning process.

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An inherently three-dimensional containment bag for articles to be cleaned in a non-immersion textile cleaning process, said bag having sufficient inherent structural rigidity to be substantially self-supporting, said bag being comprised of at least two panels, said panels being joined along at least one seam, said seam forming a rigidifying wall discontinuity.

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The bag of claim 22 wherein said bag is comprised of two panels and a closure means, wherein said bag, when empty and with said closure means disengaged, is in the form of a flat bag having a closed bottom and an open top, said bag being characterized by having a first seam extending across the width of said bag and forming said closed bottom of said bag, and further having a second seam and a third seam, said second and said third seams being substantially parallel to each other and each being substantially perpendicular to said first seam and extending from a respective point that is located within a substantially

central region along the length of said first seam in the direction of said open top.

24. The bag of Claim 23 wherein said second and third seams in said flat bag are substantially coincident and extend to said open top, said open top being formed by said disengaged closure means.
25. The bag of Claim 23 wherein said second and third seams in said flat bag are parallel but spaced apart a predetermined distance along the length of said first seam.
26. The bag of Claim 23 wherein said seams and said closure means, when said closure means is engaged, are sufficiently stiff to allow said bag, when empty, to assume a substantially self-supporting, three-dimensional shape.
27. The bag of Claim 26 wherein, in said three-dimensional shape, the projection of a line coincident with said first seam and a line coincident with said closure means form an angle that is substantially 90 degrees.
28. The bag of Claim 26 wherein, in said three-dimensional shape, the projection of a line coincident with said first seam and a line coincident with said closure means form an angle that is at least about 30 degrees.
29. A containment bag for articles to be cleaned in a textile cleaning process, said cleaning process comprising placing articles to be cleaned into said bag through an opening having a closure means, securing said closure means, and subjecting said articles within said bag to a tumbling action in the presence of a cleaning agent, wherein said bag, when empty and with said closure means secured, readily defines an enclosed space having a predetermined three-dimensional shape, said bag having bag walls that contribute to said bag having an inherent structural rigidity whereby said enclosed space is maintained in said predetermined shape sufficiently to promote, during said cleaning process, the free tumbling of articles placed in the bag, wherein said bag walls are comprised

of a textile composite, said composite comprising a textile substrate having a polymer facing.

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30. The bag of Claim 29 wherein said pre-determined three-dimensional shape is a geometric solid selected from the group consisting of a rectangular solid, a cylinder, a rounded tetrahedron, and a tetrahedron.

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31. The bag of Claim 29 wherein said pre-determined three-dimensional shape is that of a tetrahedron.

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32. The bag of Claim 29 wherein said polymer facing forms the interior surface of said bag.

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33. The bag of Claim 29 wherein said textile substrate is a textile web comprised of fibers selected from the group consisting of polyester, polyamide, polyolefin, acrylic, and cotton.

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34. The bag of Claim 33 wherein said textile web is a woven textile fabric.

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35. The bag of Claim 29 wherein said polymer facing is comprised of a polymer selected from the group consisting of polyester, polyolefin, polyamide, polyurethane, and acrylic.

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36. The textile composite of Claim 33 wherein said fibers define interstices in said substrate, and wherein said polymer facing penetrates into said interstices.

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37. The textile substrate of Claim 36 wherein said polymer facing forms anchoring structures that penetrate and extend through said substrate from the facing side to the opposite side of said substrate, said anchoring structures terminating on said opposite side being sized and shaped to resist retraction from said penetrated substrate.

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38. The bag of Claim 29 wherein said fabric composite comprising said bag has an average Kawabata stiffness value of at least about 0.6 gms (force) cm^2 / cm , and said polymer-coated interior of said bag has an average Kawabata surface friction value of less than about 0.35.

39. The bag of Claim 38 wherein said polymer-coated interior of said bag has an average Kawabata surface friction value of less than about 0.30

40. The bag of Claim 29 wherein said fabric composite comprising said bag has an average Kawabata stiffness value of at least about 1.0 gms (force) cm^2 / cm .

41. The bag of Claim 40 wherein said polymer-coated interior of said bag has an average Kawabata surface friction value of less than about 0.3.

42. The bag of Claim 29 wherein said fabric composite comprising said bag has an average Kawabata stiffness value of at least about 1.2 gms (force) cm^2 / cm .

43. The bag of Claim 42 wherein said polymer-coated interior of said bag has an average Kawabata surface friction value of less than about 0.3.

44. The bag of Claim 29 wherein said fabric composite comprising said bag has an average Kawabata stiffness value of at least about 1.4 gms (force) cm^2 / cm .

45. The bag of Claim 44 wherein said polymer-coated interior of said bag has an average Kawabata surface friction value of less than about 0.35.

46. The bag of Claim 44 wherein said polymer-coated interior of said bag has an average Kawabata surface friction value of less than about 0.25.

47. An inherently two-dimensional containment bag for articles to be cleaned in a textile cleaning process, said cleaning process being comprised of placing articles to be cleaned into said bag through an opening having a closure means, securing said closure means, and subjecting said articles within said bag to a

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tumbling action in the presence of a cleaning agent, said containment bag being comprised of a sheet material having a minimum average Kawabata stiffness value of at least about 0.6 gms (force) cm^2/cm . and a maximum average Kawabata stiffness value of about 3.0 gms (force) cm^2/cm ., and wherein the interior surface of said bag has a maximum average Kawabata surface friction value of about 0.35.

48. The bag of Claim 47 wherein said sheet material has a minimum average Kawabata stiffness value of at least about 0.7 gms (force) cm^2/cm . and a maximum average Kawabata stiffness value of about 2.0 gms (force) cm^2/cm .

49. The bag of Claim 48 wherein the interior surface of said bag has a maximum average Kawabata surface friction value of about 0.25.

50. The bag of Claim 47 wherein said sheet material has a minimum average Kawabata stiffness value of at least about 0.8 gms (force) cm^2/cm . and a maximum average Kawabata stiffness value of about 1.6 gms (force) cm^2/cm ., and wherein the interior surface of said bag has a maximum average Kawabata surface friction value of about 0.35.

51. The bag of Claim 50 wherein the interior surface of said bag has a maximum average Kawabata surface friction value of about 0.30.

52. The bag of Claim 50 wherein the interior surface of said bag has a maximum average Kawabata surface friction value of about 0.25.

53. The bag of Claim 47 wherein said closure means is a zipper.

54. The bag of Claim 47 wherein said bag has sufficient inherent structural rigidity to maintain, during said cleaning process, a free tumbling volume within said enclosed space.

77. The composite of Claim 76 wherein said faced surface of said substrate has a maximum average Kawabata surface friction value of about 0.30.

78. The composite of Claim 77 wherein said faced surface of said substrate has a maximum average Kawabata surface friction value of about 0.25.

79. The textile composite of Claim 73 wherein said textile substrate is comprised of fibers selected from the group consisting of polyester, polyamide, polyolefin, acrylic, and cotton, and wherein said fibers define interstices in said substrate, and wherein said polymer facing penetrates into said interstices.

80. The textile substrate of Claim 79 wherein said polymer facing forms anchoring structures that penetrate and extend through said substrate from the facing side to the opposite side of said substrate, said anchoring structures terminating on said opposite side being sized and shaped to resist retraction from said penetrated substrate.

81. The textile composite of Claim 79 wherein said substrate is a woven textile substrate comprised of yarns having deniers within the range of 30 to 600 denier.

82. The textile composite of Claim 79 wherein said substrate is a warp knitted textile substrate comprised of yarns having deniers within the range of 30 to 600 denier.

83. The textile composite of Claim 79 wherein said substrate is a heat-resistant non-woven substrate comprised of yarns having lengths within the range of about 0.5 to about 4.5 inches.

55. The bag of Claim 54 wherein said bag has bag walls that contribute to said inherent structural rigidity, said bag walls being comprised of a fabric composite, said composite comprising a textile substrate having a polymer facing.

56. The bag of Claim 55 wherein said bag is in a geometric shape having at least one corner area, and wherein said corner area has been truncated along a line extending across said corner area, whereby said articles placed in said bag are prevented from occupying said corner area.

57. An inherently three-dimensional, self-supporting, flexible container for use in a non-immersion cleaning process in which textile articles are freshened by means of introducing said articles to cleaning vapors and then removing said vapors from the container, said container being adapted to provide for the movement of gas into and out of the container through at least one vent in a wall of said container, wherein said movement of gas is induced by kinetic pumping.

58. The container of Claim 57 wherein said vent is in the form of a zipper.

359. A textile composite for constructing an inherently three-dimensional containment bag for use in a non-immersion dry cleaning process, wherein said composite is comprised of a textile substrate with a surface carrying a polymer facing, said composite having a minimum average Kawabata stiffness value of at least about 0.6 gms (force) cm² /cm. and wherein the surface carrying said polymer facing has a maximum average Kawabata surface friction value of about 0.35.

38 60. The composite of Claim 59 wherein said faced surface of said substrate has a maximum average Kawabata surface friction value of about 0.3.

39 61. A textile composite for constructing an inherently three-dimensional containment bag for use in a non-immersion dry cleaning process, wherein said composite is comprised of a textile substrate with a surface having a polymer facing, said

composite having a minimum average Kawabata stiffness value of at least about 1.0 gms (force) cm² /cm.

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62. The composite of Claim 61 wherein the surface carrying said polymer facing has a maximum average Kawabata surface friction value of about 0.30.

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63. The composite of Claim 61 wherein said composite has an average Kawabata stiffness value of at least about 1.2 gms (force) cm² /cm.

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64. The composite of Claim 61 wherein the surface carrying said polymer facing has a maximum average Kawabata surface friction value of about 0.30.

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65. The composite of Claim 61 wherein said composite has an average Kawabata stiffness value of at least about 1.4 gms (force) cm² /cm.

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66. The composite of Claim 61 wherein the surface carrying said polymer facing has a maximum average Kawabata surface friction value of about 0.3.

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67. The composite of Claim 61 wherein the surface carrying said polymer facing has a maximum average Kawabata surface friction value of about 0.25.

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68. The textile composite of Claim 61 wherein said textile substrate is comprised of fibers selected from the group consisting of polyester, polyamide, polyolefin, acrylic, and cotton, and wherein said fibers define interstices in said substrate, and wherein said polymer facing penetrates into said interstices.

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69. The textile substrate of Claim 68 wherein said polymer facing forms anchoring structures that penetrate and extend through said substrate from the facing side to the opposite side of said substrate, said anchoring structures terminating on said opposite side being sized and shaped to resist retraction from said penetrated substrate.

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The textile composite of Claim 68 wherein said substrate is a woven textile substrate comprised of yarns having deniers within the range of 30 to 600 denier.

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The textile composite of Claim 68 wherein said substrate is a warp knitted textile substrate comprised of yarns having deniers within the range of 30 to 600 denier.

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The textile composite of Claim 68 wherein said substrate is a heat-resistant non-woven substrate comprised of yarns having lengths within the range of about 0.5 to about 4.5 inches.

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A textile composite for constructing an inherently two-dimensional containment bag for use in a non-immersion dry cleaning process, wherein said composite is comprised of a textile substrate and a polymer facing, said composite having a minimum average Kawabata stiffness value of at least about 0.6 gms (force) $\text{cm}^2/\text{cm.}$ and a maximum average Kawabata stiffness value of about 3.0 gms (force) $\text{cm}^2/\text{cm.}$, and wherein the surface carrying said polymer facing has a maximum average Kawabata surface friction value of about 0.35.

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The composite of Claim 73 wherein said sheet material has a minimum average Kawabata stiffness value of at least about 0.7 gms (force) $\text{cm}^2/\text{cm.}$ and a maximum average Kawabata stiffness value of about 2.0 gms (force) $\text{cm}^2/\text{cm.}$

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The composite of Claim 74 wherein the interior surface of said bag has a maximum average Kawabata surface friction value of about 0.25.

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The composite of Claim 73 wherein said sheet material has a minimum average Kawabata stiffness value of at least about 0.8 gms (force) $\text{cm}^2/\text{cm.}$ and a maximum average Kawabata stiffness value of about 1.6 gms (force) $\text{cm}^2/\text{cm.}$, and wherein the faced surface of said substrate has a maximum average Kawabata surface friction value of about 0.35.